UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

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Refer to NMFS No: OPR-2023-01130

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Director, Office of Transportation, Office of Air and Radiation
United States Environmental Protection Agency
120 Pennsylvania Ave NW
Washington, DC, 20460
VIA EMAIL: Dunham.Sarah@epa.gov

RE: Concurrence Letter for the Environmental Protection Agency's (EPA) Renewable Fuel Standard (RFS) Set Rule

Dear Ms. Dunham:

On May 19, 2023, the National Marine Fisheries Service (NMFS) received your request for a written concurrence that the Environmental Protection Agency's (EPA) rulemaking for the Renewable Fuel Standard (RFS) Set Rule for 2023-2025 (RFS Set Rule) is not likely to adversely affect species listed as threatened or endangered or critical habitats designated under our jurisdiction under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.). The May 19 request and its attached Biological Evaluation (BE) supersede EPA's initial request and BE sent on January 30, 2023. The May 19 revised BE (EPA 2023) provided additional information and analyses that NMFS had identified as necessary to proceed with consultation.

Upon review of the revised BE (EPA 2023), NMFS identified information that was not addressed. On May 31, 2023, EPA provided the additional information to NMFS. On June 5, 2023, after completing our review NMFS deemed the information sufficient to initiate consultation and informed EPA. This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR Part 402, and agency guidance for preparation of letters of concurrence.

Amendments to the Part 402 regulations governing interagency consultation became effective on October 28, 2019 (84 FR 44976). On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order 2 days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in this letter would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with agency guidelines issued under section 515 of the Treasury and General Government Appropriations Act of 2001 (Data Quality Act; 44 U.S.C. 3504(d)(1) and 3516). A complete record of this informal consultation is on file electronically at NMFS Office of Protected Resources in Silver Spring, Maryland.

Consultation History

NMFS provided technical assistance to EPA prior to initiating this consultation, which is included in the consultation history because it led to the completion of the final BE EPA provided NMFS in May 2023. The consultation history is as follows:

- March 23, 2021 – Initial meeting between EPA and NMFS and the Fish and Wildlife Service (the "Services") to begin technical assistance to EPA in their development of a BE. Subsequent meetings followed approximately every month. During the meetings, EPA provided presentations describing various aspects of the action and addressed questions from the Services.
- September 30, 2021 – Email from EPA to the Services requesting geospatial information related to listed or proposed endangered or threatened species and designated critical habitat in the potential action area.
- November 15, 2021 – Email with attached files from NMFS to EPA providing information on the location of listed or proposed endangered or threatened species and designated critical habitat.
- June 21, 2022 – Email from EPA to the Services to share draft BE chapters describing the action and request review. Comments and questions were provided to EPA during subsequent meetings.
- December 1, 2022 – Email from EPA to the Services to share draft BE chapters describing methods to estimate land use changes associated with the action and request review. Comments and questions were provided to EPA during subsequent meetings.
- January 30, 2023 – Submittal by EPA of a draft BE to Services with Request for Concurrence.
- February 10, 2023 – NMFS communicated to EPA that additional information and analyses were needed to initiate consultation. For example, the BE must expand the land use analysis to include NMFS species that have freshwater residency.
- February 17, 2023 – NMFS provided EPA with additional spatial information regarding the ranges and critical habitats of NMFS species.
- April 10, 2023 – NMFS sent EPA a final set of comments describing additional information and analyses needed in a revised BE to initiate consultation.
- May 19, 2023 – EPA submitted revised draft of BE to Services with Request for Concurrence.
- May 26, 2023 – NMFS communicated to EPA regarding an additional assessment that was lacking in the revised BE (specifically, the potential for soybean expansion in several Atlantic states). NMFS attached a document describing the need and identifying options for addressing the assessment need.
- May 31, 2023 – EPA provided responses to NMFS' request for more information regarding the potential for soybean expansion.

- June 5, 2023 – After review of EPA's responses, NMFS acknowledged that the available information was now sufficient to initiate consultation.

Action Agency's Effect Determinations

EPA identified 73 ESA-listed species and 57 designated critical habitats (including proposals for each) under NMFS jurisdiction that potentially occur in the action area (see Table 1 below based on species and habitats in Table IX.C-1 of EPA 2023). Experimental populations (ESA section 10(j)) present in the action area are considered as a single listed entity within ESA-listed species' populations for the purposes of this consultation rather than discussed separately. EPA concluded that the action may affect, but is not likely to adversely affect all of the species in Table 1. Additionally, EPA concluded that the action may affect, but is not likely to adversely affect any of these species' designated critical habitats.

Table 1. EPA concluded that the action may affect, but is not likely to adversely affect the 73 listed and proposed species and 57 designated and proposed critical habitats (CH) shown below. Where applicable, Evolutionary Significant Units (ESU) and Distinct Population Segments (DPS) are identified.

Group	Common Name	ESU/DPS	Status	Listing	CH
Corals	Elkhorn coral *Acropora palmata*	None	Threatened	71 FR 26852	73 FR 72210
	Lobed star coral *Orbicella annularis*	None	Threatened	79 FR 53852	85 FR 76302 (Proposed)
	Mountainous star coral *Orbicella faveolata*	None	Threatened	79 FR 53851	85 FR 76302 (Proposed)
	Boulder star coral *Orbicella franksi*	None	Threatened	79 FR 53851	85 FR 76302 (Proposed)
Mollusks	Black abalone *Haliotis cracherodii*	None	Endangered	74 FR 1937	76 FR 66806
Echinoderms	Sunflower sea star *Pycnopodia helianthoides*	None	Threatened	88 FR 16212 (Proposed)	None
Fishes	Shortnose sturgeon *Acipenser brevirostrum*	None	Endangered	32 FR 4001	None
	Green sturgeon *Acipenser medirostris*	Southern	Threatened	71 FR 17757	74 FR 52299
	Gulf sturgeon *Acipenser oxyrinchus (=oxyrhynchus) desotoi*	None	Threatened	56 FR 49653	68 FR 13369
	Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*	Carolina	Endangered	77 FR 5914	82 FR 39160
		Chesapeake Bay	Endangered	77 FR 5880	82 FR 39160
		Gulf of Maine	Threatened	77 FR 5880	82 FR 39160
		New York Bight	Endangered	77 FR 5880	82 FR 39160
		South Atlantic	Endangered	77 FR 5914	82 FR 39160
	Coho salmon *Oncorhynchus (=Salmo) kisutch*	Central California coast	Endangered	70 FR 37160	64 FR 24049
		Lower Columbia River	Threatened	70 FR 37160	81 FR 9251
		Oregon coast	Threatened	76 FR 35755	73 FR 7816

		Southern Oregon & Northern California coasts	Threatened	70 FR 37160	64 FR 24049
	Steelhead *Oncorhynchus (=Salmo) mykiss*	California Central Valley	Threatened	71 FR 834	70 FR 52488
		Central California coast	Threatened	71 FR 834	70 FR 52488
		Lower Columbia River	Threatened	71 FR 834	70 FR 52630
		Middle Columbia River	Threatened	71 FR 834	70 FR 52630
		Northern California	Threatened	71 FR 834	70 FR 52488
		Puget Sound	Threatened	72 FR 26722	81 FR 9251
		Snake River Basin	Threatened	71 FR 834	70 FR 52630
		South-Central California coast	Threatened	71 FR 834	70 FR 52488
		Southern California	Endangered	71 FR 834	70 FR 52488
		Upper Columbia River	Threatened	74 FR 42605	70 FR 52630
		Upper Willamette River	Threatened	71 FR 834	70 FR 52630
	Sockeye salmon *Oncorhynchus (=Salmo) nerka*	Ozette Lake	Threatened	70 FR 37160	70 FR 52630
		Snake River	Endangered	70 FR 37160	58 FR 68543
	Chinook salmon *Oncorhynchus (=Salmo) tshawytscha*	California Coastal	Threatened	70 FR 37160	70 FR 52488
		Central Valley spring-run	Threatened	64 FR 50394	70 FR 52488
		Lower Columbia River	Threatened	70 FR 37160	70 FR 52630
		Puget Sound	Threatened	70 FR 37160	70 FR 52630
		Sacramento River winter-run	Endangered	54 FR 32085	58 FR 33212
		Snake River fall-run	Threatened	70 FR 37160	58 FR 68543
		Snake River spring/ summer-run	Threatened	79 FR 20802	64 FR 57399
		Upper Columbia River spring-run	Endangered	70 FR 37160	70 FR 52630
		Upper Willamette River	Threatened	70 FR 37160	70 FR 52630
	Chum salmon *Oncorhynchus keta*	Columbia River	Threatened	70 FR 37160	70 FR 52630
		Hood Canal summer-run	Threatened	70 FR 37160	70 FR 52629
	Eulachon *Thaleichthys pacificus*	Southern	Threatened	75 FR 13012	76 FR 65323
	Atlantic salmon *Salmo salar*	Gulf of Maine	Endangered	74 FR 29344	74 FR 39903

	Bocaccio *Sebastes paucispinis*	Puget Sound/ Georgia Basin	Endangered	75 FR 22276	79 FR 68042
	Yelloweye rockfish *Sebastes ruberrimus*	Puget Sound/ Georgia Basin	Threatened	75 FR 22276	79 FR 68041
	Smalltooth sawfish *Pristis pectinata*	U.S. portion of range	Endangered	68 FR 15674	74 FR 45353
	Scalloped hammerhead shark *Sphyrna lewini*	Central & Southwest Atlantic	Threatened	79 FR 38213	None
	Oceanic whitetip shark *Carcharhinus longimanus*	None	Threatened	83 FR 4153	None
	Giant manta ray *Manta birostris*	None	Threatened	83 FR 2916	None
Marine Mammals	Guadalupe fur seal *Arctocephalus townsendi*	None	Threatened	50 FR 51252	None
	Steller sea lion *Eumetopias jubatus*	Western	Threatened	55 FR 49204	58 FR 45269
	Sei whale *Balaenoptera borealis*	None	Endangered	35 FR 8491	None
	Blue whale *Balaenoptera musculus*	None	Endangered	35 FR 18319	None
	Fin whale *Balaenoptera physalus*	None	Endangered	35 FR 12222	None
	Rice's whale *Balaenoptera ricei*	Gulf of Mexico	Endangered	86 FR 47022	None
	North Atlantic Right Whale *Eubalaena glacialis*	None	Endangered	73 FR 12024	81 FR 4837
	North Pacific Right Whale *Eubalaena japonica*	None	Endangered	73 FR 12024	73 FR 19000
	Humpback whale *Megaptera novaeangliae*	Central America	Endangered	81 FR 62259	84 FR 21082
		Mexico	Threatened	81 FR 62259	84 FR 21082
		Western North Pacific	Endangered	81 FR 62259	84 FR 21082
	Killer whale *Orcinus orca*	Southern Resident	Endangered	70 FR 69903	71 FR 69054
	Sperm whale *Physeter catodon (=macrocephalus)*	None	Endangered	35 FR 18319	None
	False killer whale *Pseudorca crassidens*	Main Hawaiian Islands Insular	Endangered	77 FR 70915	83 FR 35062
Sea turtles	Loggerhead sea turtle *Caretta caretta*	North Pacific Ocean	Endangered	76 FR 58867	None
		Northwest Atlantic Ocean	Threatened	76 FR 58867	79 FR 39855
	Green sea turtle *Chelonia mydas*	East Pacific	Threatened	81 FR 20057	None
		North Atlantic	Threatened	81 FR 20057	63 FR 46693
	Leatherback sea turtle *Dermochelys coriacea*	None	Endangered	35 FR 8491	77 FR 4169 Pacific Ocean
	Hawksbill sea turtle *Eretmochelys imbricata*	None	Endangered	35 FR 8491	63 FR 46693

	Kemp's ridley sea turtle *Lepidochelys kempii*	None	Endangered	35 FR 18319	None
	Olive ridley sea turtle *Lepidochelys olivacea*	all other areas	Threatened	43 FR 32800	None
		Mexico's Pacific coast breeding colonies	Endangered	43 FR 32800	None

Proposed Action

The RFS Set Rule involves numerous EPA authorities, requirements, and regulatory changes. EPA provided a detailed description of the program in the final BE (EPA 2023). The following is a brief summary of the action incorporating information from the BE (EPA 2023) that highlights portions that are most relevant to NMFS's determination.

Congress created the RFS program to reduce greenhouse gas emissions and enhance energy security through expanding the nation's use of renewable fuels. This program was created under the Energy Policy Act of 2005 (EPAct), which amended the Clean Air Act (CAA). The Energy Independence and Security Act of 2007 (EISA) further amended the CAA by expanding the RFS program. Under CAA section 211(*o*), the RFS program requires that certain minimum volumes of renewable fuel must be used in the transportation sector, for all years after 2005, with the goal of replacing or reducing the quantity of petroleum-based transportation fuel, heating oil, or jet fuel. Section 211(*o*) contains specific renewable fuel volume targets through 2022 and provides EPA with the authority for setting volumes for 2023 and beyond.

The RFS program places an obligation on producers and importers of gasoline and diesel (hereafter simplified to "refiners") to utilize certain amounts of renewable fuel to replace fossil-based transportation fuels. Table 2 shows the volume targets for the RFS Set Rule specified in Renewable Identification Numbers (RINs) that are credits used by the RFS program as the 'currency' for compliance.

Table 2 (from Table IV.A-3 of EPA 2023). RFS Set Rule Volume Targets (billion RINs)[a]

Category	2023	2024	2025
Cellulosic biofuel	0.84	1.09	1.38
Biomass-based diesel[b]	2.82	2.89	3.20
Advanced biofuel	5.94	6.29	1.08
Renewable fuel	20.94	21.54	22.33
Supplemental standard	0.25	n/a	n/a

[a] One RIN is equivalent to one ethanol-equivalent gallon of renewable fuel.

[b] These volumes are in physical gallons (rather than RINs).

While the RFS Set Rule does not specify how refiners are to meet their RFS obligations for years 2023-2025, domestically-grown crops for production of renewable fuel have played a role in the RFS program since it was established in 2005 as one option used by refiners to meet their obligations. This can be seen in historic data on biofuel production from 2016-2021 provided in EPA 2023 (Tables 3, 4, and 5).

Table 3 (from Table III.C-2 of EPA 2023). Fuel/feedstock combinations for non-cellulosic advanced biofuel that were produced in the U.S. from 2016–2021

Fuel type	Feedstock	Average contribution to total
Biodiesel	Soybean Oil	42%
Biodiesel	Waste Oils/Fats/Greases	16%
Renewable diesel	Waste Oils/Fats/Greases	14%
Biodiesel	Corn oil	9%
Biodiesel	Canola Oil	8%
Renewable diesel	Corn oil	5%
Renewable diesel	Soybean Oil	4%
Ethanol	Separated Food Wastes	1%
Gasoline/naphtha	Separated Food Wastes	1%
Gasoline/naphtha	Corn oil	0.3%
Jet fuel	Waste Oils/Fats/Greases	0.1%
Gasoline/naphtha	Waste Oils/Fats/Greases	0.1%
Heating oil	Separated Food Wastes	0.1%
LPG	Waste Oils/Fats/Greases	0.1%

Table 4 (from Table III.C-3 of EPA 2023). Fuel/feedstock combinations for conventional renewable fuel that were produced in the U.S. between 2016 and 2021

Fuel type	Feedstock	Average contribution to total
Ethanol	Corn starch	>99%
Ethanol	Grain Sorghum	<1%

Table 5 (from Table III.C-4 of EPA 2023). Average proportions from 2016-2021 for domestically produced feedstocks used to produced biofuel

	Cellulosic	Non-cellulosic advanced	Conventional
Crop-based	0.4%	55%	99.99%
Non-crop-based	99.6%	45%	0.01%

The predominant feedstock for 2016-2021 renewable fuel production was crop-based feedstocks consisting of corn, soybean, and canola. Although there is some uncertainty regarding the extent to which domestically-grown crop-based feedstocks will be used by refiners to comply with the RFS Set Rule, based on past observations and the best scientific and commercial data available, these crops are expected to remain the predominant crop-based feedstocks produced domestically to meet the RFS Set Rule volumes for 2023-2025 (e.g., Table IV.A-4 of EPA 2023).

While the location, extent and nature of any changes in crop production are uncertain, past RFS rules have led to changes in crop production and increased acres in crop production towards crops used to meet the RFS Set Rule (corn, soybean, and canola). The anticipated change in agricultural practices is likely to increase the quantity of fertilizer, pesticides, and sediment in waterways that are close to or downstream of land used to produce these crops. Any resulting changes in water quality due to changes in crop production may affect species that live in or near the impacted waterways.

Action Area

Based on an assessment of the action, EPA determined that any potential effects of the action on ESA-listed and proposed species and designated and proposed critical habitats would be due to changes in crop production in response to the RFS Set Rule. Corn, soybean, and canola are expected to continue to be the predominant crop-based feedstocks produced domestically to meet the RFS Set Rule volumes for 2023-2025. Therefore, EPA focused the action area on the footprint of the continental U.S. where corn, soybean, and canola are currently grown and could be grown in response to the RFS Set Rule.

EPA used the Cropland Data Layer (CDL) from the United States Department of Agriculture (USDA)'s National Agricultural Statistics Service (NASS) to identify areas used to grow corn, soybean, and canola in 2020. This region was identified by extracting corn, soybean, and canola croplands from the 2020 USDA Cropland Data Layer. EPA first applied a 15-acre minimum mapping unit filter to avoid misclassification errors in the CDL and remove small-scale farms not likely to be involved in the RFS Set Rule. EPA then expanded the region using a 5-mile buffer to capture where additional acres of corn, soybean, and canola might be most likely to be grown in the future. Within this area, not only are the soil, water, and other climate conditions likely to be similar, but the infrastructure for planting, fertilizing, harvesting, storing, and transporting the crops is likely to be available. The resulting map is considered the "area of potential land use change" and is shown in Figure 1. To completely account for potential effects to all aquatic species, this map was expanded to include waterbodies that may be impacted by potential land use changes (e.g., marine waters).

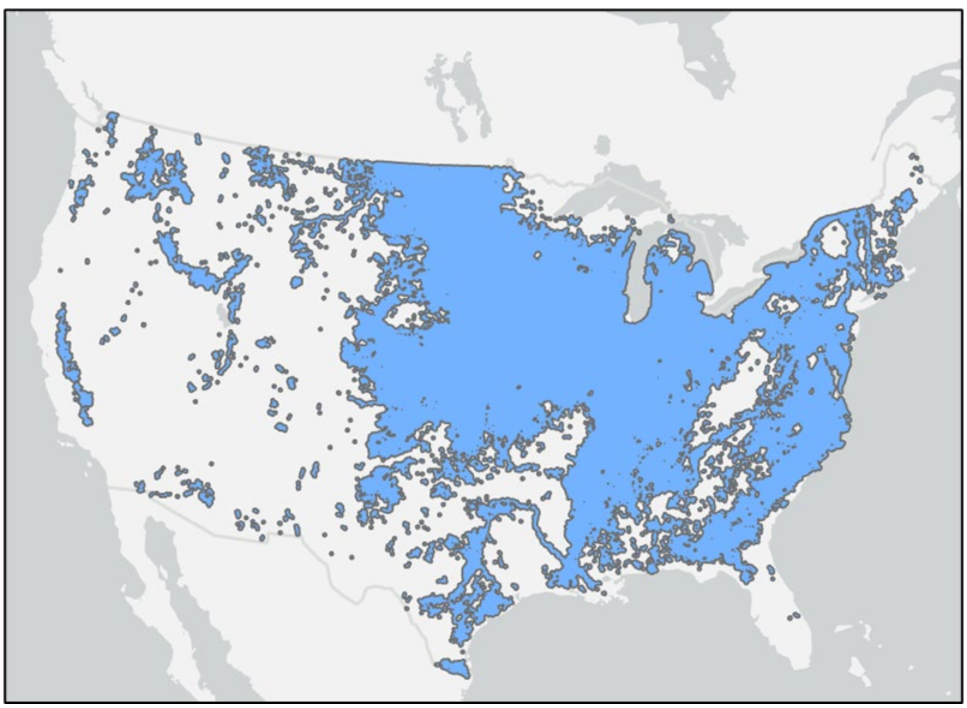

Figure 1. The geographical region where corn, soybean, and canola may be grown to meet biofuel volumes as established by the RFS actions covering the years 2023-2025. Copied from Figure IV.B-2 of EPA 2023.

Runoff from agricultural lands can transport excess nutrients (nitrogen and phosphorus), sediment, and pesticides (herbicides, insecticides, fungicides) into surrounding waterbodies, contributing to water quality impairments in streams, rivers, lakes, and groundwater. These pollutants can persist in the environment for a long time eventually moving into estuaries and coastal regions. To identify the area over which all possible effects from the RFS Set Rule might occur, EPA took the area of potential land use change (shown in Figure 1) and expanded it to capture downstream regions that could be affected by agricultural non-point source pollution. To do so, EPA used the National Hydrography Dataset (NHD) Version 2 Catchment Data, NHD Version 2 Plus Attribute Flowline Value-Added Attributes, and the trace downstream tool on ArcGIS Pro. The resulting action area is shown in Figure 2.

Figure 2. The action area for the RFS Set Rule copied from Figure IV.B-4 of EPA 2023.

Affected ESA-listed Species and Designated Critical Habitat

ESA-listed and proposed species and designated and proposed critical habitats under NMFS jurisdiction that are present in the action area are listed in Table 1.

Critical habitat designated or proposed for ESA-listed species includes physical and biological features (PBFs) that are essential for the conservation of these species. For the critical habitats of marine mammals and sea turtles in Table 1, prey availability is a PBF that may be affected within the action area. For the critical habitats for the marine invertebrates in Table 1 (corals and mollusks), PBFs that may be affected within the action area include water quality (e.g., free of chemical contaminants) and substrate quality (e.g., free of excessive sediment). For the critical habitats of fishes in Table 1, PBFs that may be affected within the action area include prey availability, water quality (e.g., free of chemical contaminants and turbidity) and substrate quality (e.g., clean gravel and hard bottom substrate). Impacts are not anticipated to other PBFs identified in the critical habitat designations for these species (such as water temperature, water velocity, water quantity, physical barriers to access).

Effects Analysis

The applicable standard to find that a proposed action is not likely to adversely affect ESA-listed species or designated critical habitat is whether the effects to listed species and critical habitat are expected to be discountable, insignificant, or completely beneficial. Completely beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the response of the individual or critical habitat and include those responses that are undetectable, not measurable, or so minor they cannot be meaningfully evaluated. Discountable effects are those extremely unlikely to occur.

To assess potential effects of the RFS Set Rule NMFS used changes in crop production and associated changes in water quality.

Changes in Crop Production

As mentioned above, NMFS anticipates that any potential effects of the action on listed species and designated critical habitats would be due to changes in crop production to meet the RFS Set Rule volumes. This is due to crop production's known impacts on water quality, which are discussed in more detail below. To begin assessing the effects of the action, EPA developed estimates of the maximum potential acres of crop production nationwide that could result from refiners meeting the RFS volume requirements using U.S.-grown feedstocks. Details of the analyses are in the BE (EPA 2023) and included extrapolating past data on responses to previous RFS program requirements. NMFS considers this the best available information on the potential impacts of the 2023-2025 RFS Set Rule on future crop production in the U.S. in response to the rule. The results are summarized in Table 6.

Table 6 (from Table ES.1 of EPA 2023). Maximum potential acreage impacts for all crops in the U.S. due to increases in corn ethanol, soybean biodiesel, and canola biodiesel that can be attributed to EPA's Set Rule.

	Volume Increase in RFS Set Rule (billion gallons)			Maximum Potential Acreage Increase All Crops (million acres)		
	2023	2024	2025	2023	2024	2025
Corn ethanol	0.71	0.78	0.84	0.39	0.44	0.46
Soybean biodiesel	1.95	1.92	1.89	1.57	1.78	1.93
Canola biodiesel	0.24	0.24	0.24	0.26*	0.26*	0.26*

*Projected to occur in the North Dakota region

As discussed in the BE (EPA 2023) and highlighted here, there are numerous assumptions and uncertainties associated with these estimates of changes in crop production. The estimates are based on extrapolations that assume all of the RFS volume increases will be met using the three domestically-grown crops as feedstock. While these crops have played a dominant role in previous years, other options are available to refiners and have been used in previous years. These options include using a system of credits to "bank" volumes (e.g. RINs), importing biofuel or feedstock, and using non-crop-based feedstocks (e.g. waste oils in Table 3). While crop production is likely to play a role in the RFS Set Rule in 2023-2025, the magnitude of the increase is uncertain and the acres in Table 6 represent a maximum potential increase.

Additionally, any changes in crop production due to the RFS Set Rule will be against an inherently variable background of crop production. Impaired water quality is driven by crop production overall. For example, the production of crops to meet the RFS Set Rule may not produce an overall change in crop production due to factors discussed in Section VI of EPA 2023 (e.g. increased yields and market forces). Additionally, relevant to considering effects on NMFS species, the BE (EPA 2023) provides data showing that overall crop acres in areas that overlap with the ranges of NMFS species (e.g., areas in the West and East coast states) have seen a net decrease from 2008-2016 (Figure IV.B-3 from EPA 2023).

In addition to uncertainties in the magnitude of any increases in crop production, uncertainties exist with the locations of any changes in crop production due to the RFS Set Rule. While EPA's analyses provide estimates of potential increases in crop acres in the contiguous U.S. (summarized in Table 6), they cannot estimate the precise location of land conversions to cropland due to the RFS Set Rule. EPA and NMFS are not aware of any modelling tools available at this time that can predict with any certainty the location of these land use changes. However, to assess potential effects to listed and proposed species and designated and proposed critical habitats, it is important to assess the extent of any increase in crop acres that might occur within the range of a species or critical habitat unit.

For the three crops associated with the RFS Set Rule, EPA and/or NMFS developed approaches to estimating the potential overlap between changes in cropland and listed and proposed species' ranges and designated and proposed critical habitats. The first part of these approaches was discussed in the Action Area section and consisted of restricting the potential increase in crop acres to a 15-mile area around where a crop is already grown (the area of potential land use change). The second part consisted of allocating the total potential additional acres (based on Table 6) to acres in the area of potential land use change and determining how many of the potential acres were within each species' range and critical habitat unit. The method used to allocate the additional acres across the contiguous U.S. differed between the three crops and details are available in the BE (EPA 2023). For each crop, a brief description of the specific approach and some of the results are provided below.

1) Corn

For corn, EPA developed a probabilistic modeling approach (EPA 2023) that randomly selected 500,000 acres from the action area; with 500,000 acres chosen as a conservative value based on the largest estimated land conversion of 460,000 acres that is identified in Table 6. Only acres from within the corn area of potential land use change considered suitable for conversion to corn (e.g., non-cultivated acres of grassland and pasture) were available for selection. Once 500,000 acres were selected, for each species and critical habitat, the model was used to determine the number of acres that fell within the region both with and without a 2,600-foot buffer to account for drift when crops are treated with pesticides. To generate a large distribution of model results, the simulations were repeated 500 times for critical habitats and 100 times for species' ranges.

Based on information provided by EPA (including Table VII.A-6 of EPA 2023), Tables 7 and 8 show results for species' ranges and critical habitats, respectively. Both Tables 7 and 8 show the mean number of acres across all the model simulations. Only the results using the buffer are shown to highlight the more conservative estimate. In addition, only species and critical habitats with a mean conversion of acreage ≥1 are included in these tables, as these are the species for which crop conversion would possibly be in close proximity to their aquatic habitats (see discussion below). To provide a context for assessing the effects of the action, Tables 7 and 8 also show the acres of corn within the range of species and critical habitat and the percent overlap with the range and critical habitat of corn acres before and after the potential increase in acres as a result of implementation of the RFS Set Rule. Note that, mathematically, the change in the percent overlaps will be the same as the percent of the range or critical habitat represented by the conversion acres (the values shown in Table VII.A-6 of EPA 2023).

Table 7. Data on the overlap of corn acres with the range of species with and without potential expansion due to the RFS Set Rule.

		Acres Within Range		% of Range		
Species	**ESU/DPS**	**Corn**	**Converted**	**w/o RFS**	**w/ RFS**	**change**
Chinook salmon	Snake River fall-run	144474	2127	2.261	2.295	0.033
Chinook salmon	Upper Columbia River spring-run	165202	2205	2.380	2.412	0.032
Steelhead	Upper Columbia River	187957	2352	2.501	2.533	0.031
Sockeye salmon	Snake River	144671	1695	2.205	2.231	0.026
Steelhead	Upper Willamette River	54429	996	1.267	1.291	0.023
Atlantic sturgeon	South Atlantic	321427	2583	2.608	2.629	0.021
Chinook salmon	Upper Willamette River	51384	1029	0.906	0.924	0.018
Steelhead	Snake River Basin	145729	3114	0.695	0.710	0.015
Chinook salmon	Snake River spring/ summer-run	139960	2385	0.845	0.859	0.014
Steelhead	Middle Columbia River	247425	2418	1.431	1.445	0.014
Atlantic sturgeon	Carolina	851265	1521	7.395	7.408	0.013
Bocaccio	Puget Sound/ Georgia Basin	33648	198	2.225	2.238	0.013
Shortnose sturgeon		1598998	4245	4.912	4.925	0.013
Yelloweye rockfish	Puget Sound/ Georgia Basin	33648	192	2.225	2.238	0.013
Atlantic sturgeon	Chesapeake Bay	1067249	1170	10.493	10.504	0.012
Eulachon	Southern	10922	153	0.702	0.712	0.010
Steelhead	California Central Valley	711933	1413	4.848	4.857	0.010
Chinook salmon	Central Valley spring-run	664302	1155	5.305	5.314	0.009
Chinook salmon	Sacramento River winter-run	144686	321	4.146	4.155	0.009
Atlantic sturgeon	New York Bight	292589	894	2.678	2.686	0.008
Chinook salmon	Puget Sound	76940	492	1.277	1.285	0.008
Steelhead	Puget Sound	77558	516	1.135	1.142	0.008
Chum salmon	Columbia River	12002	204	0.390	0.396	0.007
Steelhead	Lower Columbia River	12051	207	0.273	0.278	0.005
Coho salmon	Lower Columbia River	12073	207	0.259	0.263	0.004
Chinook salmon	Lower Columbia River	12074	210	0.253	0.258	0.004
Chum salmon	Hood Canal summer-run	580	27	0.084	0.088	0.004
Green sturgeon	Southern	299167	693	1.650	1.654	0.004
Gulf sturgeon		31018	219	0.362	0.365	0.003
Atlantic sturgeon	Gulf of Maine	12199	201	0.146	0.148	0.002
Sunflower sea star		39189	210	0.347	0.349	0.002
Coho salmon	Oregon coast	2645	66	0.041	0.042	0.001
Atlantic salmon	Gulf of Maine	2090	18	0.066	0.067	0.001

Coho salmon	Southern Oregon & Northern California coasts	1803	42	0.015	0.016	0.000
Smalltooth sawfish	U.S. portion of range	4295	42	0.032	0.033	0.000
Steelhead	Central California coast	1502	6	0.039	0.040	0.000

Table 8. Data on the overlap of corn acres with the designated critical habitat (CH) of species with and without potential expansion due to the RFS Set Rule.

		Acres Within CH		% of CH		
Species	**ESU/DPS**	**Corn**	**Converted**	**w/o RFS**	**w/ RFS**	**change**
Chinook salmon	Snake River fall-run	144469	1914	2.555	2.589	0.034
Steelhead	Upper Columbia River	180157	2280	2.555	2.587	0.032
Chinook salmon	Upper Columbia River spring-run	163153	1545	2.730	2.756	0.026
Atlantic sturgeon	South Atlantic	312303	2442	3.190	3.215	0.025
Steelhead	Upper Willamette River	46196	774	1.399	1.423	0.023
Sockeye salmon	Snake River	26006	1371	0.398	0.419	0.021
Gulf sturgeon		106034	1572	1.352	1.372	0.020
Chinook salmon	Upper Willamette River	46092	864	1.006	1.025	0.019
Atlantic sturgeon	Carolina	534326	1053	9.068	9.086	0.018
Steelhead	Snake River Basin	145663	2982	0.723	0.737	0.015
Atlantic sturgeon	Gulf of Maine	5785	126	0.625	0.639	0.014
Steelhead	Middle Columbia River	210326	1893	1.444	1.457	0.013
Atlantic sturgeon	Chesapeake Bay	288926	375	9.875	9.888	0.013
Atlantic sturgeon	New York Bight	108053	336	4.093	4.106	0.013
Chinook salmon	Snake River spring/ summer-run	20923	1617	0.151	0.163	0.012
Chinook salmon	Sacramento River winter-run	106009	174	6.832	6.843	0.011
Yelloweye rockfish	Puget Sound/ Georgia Basin	10584	129	0.852	0.862	0.010
Chum salmon	Columbia River	11773	189	0.602	0.612	0.010
Bocaccio	Puget Sound/ Georgia Basin	10615	129	0.773	0.782	0.009
Eulachon	Southern	10922	144	0.702	0.711	0.009
Chinook salmon	Puget Sound	56470	393	1.305	1.314	0.009
Steelhead	California Central Valley	388644	528	6.658	6.667	0.009
Steelhead	Puget Sound	70182	492	1.168	1.176	0.008
Chinook salmon	Central Valley spring-run	136407	267	3.912	3.920	0.008
Chinook salmon	Lower Columbia River	11898	204	0.327	0.332	0.006
Steelhead	Lower Columbia River	11796	195	0.284	0.288	0.005
Coho salmon	Lower Columbia River	12067	204	0.264	0.268	0.004
Chum salmon	Hood Canal summer-run	578	24	0.095	0.099	0.004

Green sturgeon	Southern	271003	486	2.078	2.082	0.004
Atlantic salmon	Gulf of Maine	1059	6	0.206	0.207	0.001
Coho salmon	Oregon coast	2644	66	0.043	0.044	0.001

As an example, Table 7 shows that, for the Snake River fall-run ESU of Chinook salmon, 144,474 acres of corn production were estimated to be within the species' range prior to considering any potential expansion due to the RFS Set Rule. Those existing acres represent 2.261% of the species' range. On average, 2,127 acres of potential expansion within the range were randomly selected from the 500,000 acres nationwide. Following this addition to the existing acres of corn, corn would represent 2.295% of the species range. The estimated increase in the percent of the range that consists of corn cropland is 0.033.

Figure 3 shows a map illustrating the acres of corn and potential expansion (i.e., areas that the model identified as suitable for expansion) within the range of the Snake River fall-run ESU of Chinook salmon. Importantly, while all 520,264 acres of potential expansion within the range of the species are shown (predominantly grassland and pasture), the specific locations of the 2,127 acres within the range of this ESU of salmon of the 500,000 acres total in the continental U.S. that might be converted due to the RFS Set Rule are not known (0.4% of the potential expansion acres within the range). The probabilistic approach randomly selects acres from all the potential expansion acres. This represents another uncertainty in considering the effects of the RFS Set Rule that is discussed in more detail below.

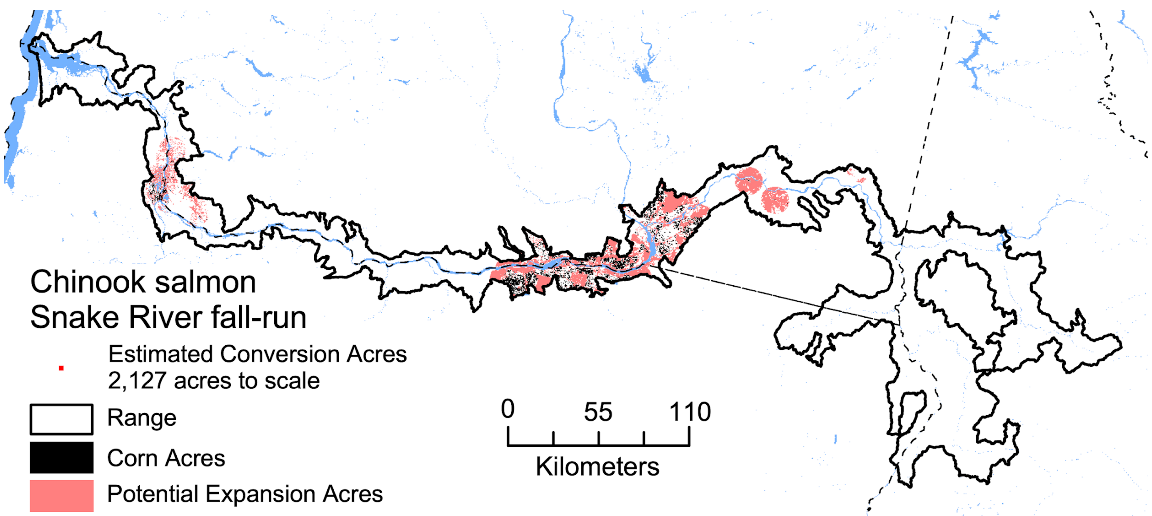

Figure 3. Range of the Snake River fall-run ESU of Chinook salmon (outline) showing existing acres of corn and acres of potential expansion of corn. An area representing the estimated total conversion acres is shown to scale.

Corn production that exists within the range, or designated critical habitat, of a species will impact the species regardless of the RFS Set Rule. It is the potential increase in corn production due to the RFS Set Rule that forms a basis for estimating the potential effects of the action (in this example, 2,217 acres for Snake River fall-run ESU of Chinook salmon) and not any effects of existing corn production absent the RFS Set Rule.

In addition to the uncertainties already mentioned above, the estimates of conversion acres within a species' range and critical habitat unit assume all potential expansion acres in the continental U.S. have an equal chance of conversion and increasing corn acres. The data depicting a general net loss of cropland in regions where NMFS' listed species are located implies that this is not likely the case (e.g., Figure IV.B-3 of EPA 2023). Cropland within the ranges and critical habitat units of NMFS species (e.g., coastal states) is probably less likely to be converted than other regions (e.g., the Midwest) where NMFS species are not present, but crop expansion has occurred in the past (e.g., Figure IV.B-3 of EPA 2023).

2) Soybean

For potential soybean crop expansion, EPA provided a more complex model analysis based on ~1.5 million or ~3.8 million acres of potential expansion (see Section VII.B of EPA 2023 for details). Rather than a random selection process, the model used by EPA relied on several factors to weigh the likelihood of a suitable potential acre being converted to soybean production. Similar to the corn model, potential expansion acres for soybeans consisted predominantly of grassland and pasture. EPA's model was limited in geographic scope; it consisted of a 15-state area that captured ~94% of the soybean acres in the continental U.S. and overlapped with only a portion of the Gulf sturgeon designated critical habitat. No other NMFS species had a range that overlapped with that area nor had designated critical habitat in the modeled area. However, substantial acres of soybean were grown in states outside of the modeled region that do overlap with NMFS species' ranges and critical habitats units (e.g., 1,690,000 acres in NC in 2022 from Table VII.B-1 of EPA 2023). Because EPA's model analysis does not extend to all NMFS species' ranges and critical habitat units, NMFS used a simplified approach based on information from EPA to create estimates for soybean comparable to those EPA created for corn.

Similar to corn but without the probabilistic approach, NMFS determined the area of potential land use considered suitable for conversion to soybean (e.g., non-cultivated acres of grassland and pasture) within species' ranges and critical habitat units (pasture and grassland within the species area and within 15-miles of existing soybean cultivation). Across all 15 of the states included in the EPA model for ~3.8 million acres of potential conversion, 2.6% of available acres of grassland and pasture were determined to have the potential to be converted to soybean (Table VII.B-1 of EPA 2023). NMFS applied this percent to the acres of potential conversion to its model analysis for all NMFS species regardless of state, to determine the estimated acres of soybean conversion within NMFS species' ranges and critical habitat units. Tables 9 and 10 show the results of this analysis. Only species and critical habitats with a mean conversion acreage ≥1 are listed, as these are the species for which crop conversion would possibly be in close proximity to their aquatic habitats (see discussion below). Tables 9 and 10 also show the acres of soybean within the range of species and critical habitat units and the percent overlap with the range and critical habitat unit of soybean acres before and after the potential increase in acres.

Table 9. Data on the overlap of soybean acres with the range of species with and without potential expansion due to the RFS Set Rule.

		Acres Within Range		% of Range		
Species	**ESU/DPS**	**Soybean**	**Converted**	**w/o RFS**	**w/ RFS**	**change**
Atlantic sturgeon	Chesapeake Bay	1224055	14131	12.035	12.174	0.139
Shortnose sturgeon		1953506	24890	6.031	6.108	0.077
Atlantic sturgeon	South Atlantic	264154	8626	2.165	2.236	0.071

Atlantic sturgeon	New York Bight	270077	6787	2.479	2.541	0.062
Atlantic sturgeon	Carolina	1250404	6771	10.894	10.953	0.059
Gulf sturgeon		56071	1995	0.666	0.690	0.024
Steelhead	Upper Columbia River	686	213	0.009	0.012	0.003
Smalltooth sawfish	U.S. portion of range	3976	286	0.031	0.033	0.002
Chinook salmon	Snake River spring/ summer-run	1530	4	0.009	0.009	0.000
Steelhead	Snake River Basin	1530	4	0.007	0.007	0.000

Table 10. Data on the overlap of soybean acres with the designated critical habitat (CH) of species with and without potential expansion due to the RFS Set Rule.

		Acres Within CH		% of CH		
Species	**ESU/DPS**	**Soybean**	**Converted**	**w/o RFS**	**w/ RFS**	**change**
Atlantic sturgeon	Chesapeake Bay	321380	3863	10.982	11.114	0.132
Atlantic sturgeon	New York Bight	110235	3431	4.189	4.319	0.130
Atlantic sturgeon	Carolina	845778	7387	14.401	14.527	0.126
Atlantic sturgeon	South Atlantic	257746	10271	2.658	2.763	0.106
Gulf sturgeon		57094	5385	0.739	0.809	0.070
Chinook salmon	Snake River spring/ summer-run	855	4	0.006	0.006	0.000
Steelhead	Snake River Basin	1535	4	0.008	0.008	0.000

As an example, Table 9 shows that, for the Chesapeake Bay DPS of Atlantic sturgeon, 1,224,055 acres of soybean were estimated to be within the species' range prior to considering any potential expansion due to the RFS Set Rule. Those existing soybean acres represent 12.035% of the species range. Extrapolating from soybean estimates from other states for the ~3.8 million acre model and using the 2.6% estimate for potential for conversion from EPA's model, NMFS calculated 14,131 acres of potential expansion within the species' range might occur because of the RFS Set Rule. Both of these estimates are conservative in that they are not adjusted for any crop rotation (i.e. they assume soybean will be grown every year). Following this expansion, soybean would represent 12.174% of the species range. Thus, the estimated increase in the percent of the range for the Chesapeake Bay DPS of Atlantic sturgeon that consists of soybean production is 0.139.

Figure 4 shows a map illustrating the acres of soybean and potential expansion within the range of the Chesapeake Bay DPS of Atlantic sturgeon. Importantly, while all 543,506 acres potential expansion within the species range are shown (grassland and pasture), the specific locations of the 14,131 acres within this sturgeon DPS' range of the 3.8 million acres total in the continental U.S. that might be converted due to the RFS Set Rule are not known (2.6% of the potential expansion acres within the range). This represents another uncertainty in considering the effects of the RFS Set Rule that is discussed in more detail below.

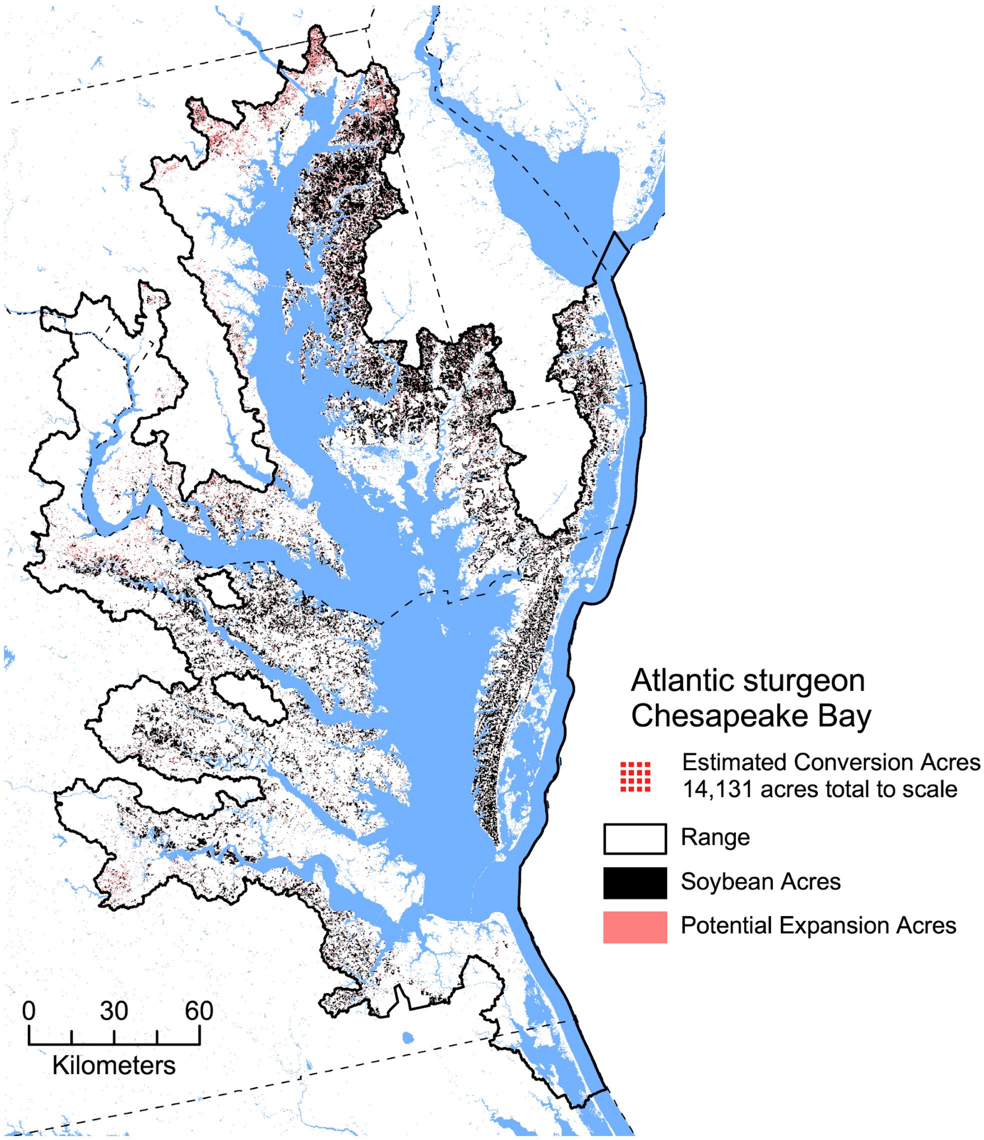

Figure 4. Range of the Chesapeake Bay DPS of Atlantic sturgeon (outline) showing existing acres of soybean and acres of potential expansion of soybean. Areas representing the estimated total conversion acres are shown to scale.

Like with corn, soybean production that exists within the range of a species or critical habitat unit will affect the species or critical habitat regardless of the RFS Set Rule. It is the potential increase in soybean due to the RFS Set Rule that forms a basis for estimating the potential effects of the action on these NMFS resources. Similar uncertainties exist for soybean as for corn in that cropland within NMFS species' ranges and critical habitat units (e.g., coastal states) is probably less likely to be converted to soybean than other regions (e.g., the Midwest) given where net gains and losses of cropland have occurred in the past (e.g., Figure IV.B-3 of EPA 2023).

3) Canola

Based on a number of factors (e.g. proximity to processing facilities), EPA projected that increases in canola acres changes due to the RFS Set Rule will likely be in the region of North Dakota (e.g. Table VI.C-7 of EPA 2023). NMFS does not anticipate any changes to canola acres within NMFS species' ranges or critical habitats units and, therefore, potential crop conversions are also not expected to be in close proximity to NMFS species' aquatic habitats. Potential downstream impacts (i.e. Gulf of Mexico) to NMFS species and critical habitats will be addressed below.

Changes in Water Quality
The conversion of land to growing corn or soybean would produce a number of stressors that may affect listed and proposed species and designated and proposed critical habitats. It is important to consider that stressors may be affecting listed and proposed species and designated and proposed critical habitats due to the land use present prior to conversion. Potential stressors in terrestrial habitats resulting from the conversion of cropland as a result of the proposed rule such as land use conversion (e.g., pasture acres to crop acres) or increased vehicle activity (e.g., planting, harvesting, and transporting crops) would not be anticipated to affect NMFS resources directly through habitat loss.

The BE (EPA 2023) provided information on three stressors associated with agricultural activity that NMFS considered relevant to potential impacts to aquatic habitats: nutrients, sediments, and pesticides. All three pollutants are known to be transported from agricultural fields to nearby waterbodies (for a review see Mateo-Sagasta et al. 2018). From there, they can impact water quality not just in nearby edge-of-field streams and rivers but at a significant distance from the location of the field. However, the impact of crop production on water quality is influenced by a variety of factors, including agricultural practices, soil type, and rainfall, among others, which can vary widely depending on the specific location where a crop is grown. This presents substantial challenges and uncertainties in assessing changes in water quality associated with land conversion to corn and soybean crops, in the case of NMFS resources, due to the RFS Set Rule.

For nutrients, EPA developed estimates of potential increases in nitrogen and phosphorus loading due to the RFS Set Rule based on modeling the Missouri River Basin using the Soil and Water Assessment Tool (SWAT). SWAT is a small watershed to river basin-scale model used to predict the water quality impacts of land use and land management practices in various regions of the United States and around the world. EPA extrapolated the results and estimated an increase of 0.3%–0.8% and 0.9%–2.1% of total nitrogen and phosphorus, respectively, at the outlet of the Mississippi River. It is important to note that there are several limitations and uncertainties with these estimates. Specifically, the lack of detailed information on site-specific conditions of fertilizer use in the Missouri River Basin means uncertainty in the inputs to the SWAT model and, thus, its outputs. Second, how well results from one river basin (the Missouri) can be extrapolated to other river basins with differing characteristics (e.g., the Mississippi or Sacramento) is unknown. Third, the estimates assume that the RFS Set Rule volume requirements are met solely by increases in crop production. Fourth, the high end of the ranges presented represent a scenario where all of the new cropland modeled is used to produce corn, whereas most of the increase in cropland is expected to be soybean production. Lastly, the model results do not address how upstream tributaries, including small rivers and streams, may be affected by nearby cropland conversion. NMFS relies on these estimates only qualitatively, as these uncertainties (specifically, the first, third and fourth limitations on these data identified above) suggest that actual increases in nutrient loadings due to the RFS Set Rule will be lower and represent small percentage increases from existing nutrient loadings that are likely difficult to distinguish from ongoing nutrient loadings from other land uses.

For sediments, while acknowledging the contribution of sediment to changes in water quality due to changes in crop production, EPA did not provide any estimates of sediment loading into aquatic habitats. Soil erosion is often increased due to tillage and cultivation of land (Mateo-Sagasta 2018), with corn being a good example. However, as for the other pollutants, site-specific conditions will determine the extent and nature of any potential sediment loading to waterbodies (e.g., soil type and precipitation). The lack of detailed information on the extent, location, and nature of fields that will potentially be converted to corn or soybean limits the ability to model sediment loading into aquatic habitats at the scale needed for this assessment. NMFS does not have estimates of increases in sediment loading into aquatic habitats either at the edge-of-field or watershed scale. Similar to nutrients, NMFS assessed increases in sediment loadings due to the RFS Set Rule only qualitatively. Based on the SWAT model outputs showing that estimated total suspended sediments from the Missouri River Basin were less than total nitrogen and total phosphorus (Figure VIII.A-3 of EPA 2023) and the limited extent of crop conversions within the ranges and critical habitat units of NMFS species, NMFS determined increases in sediment loadings would represent a small percentage increase from existing sediment loadings (e.g., ≤1%).

For pesticides, EPA provided a list of the 15 pesticides most commonly applied to corn and soybean (TableVIII.A-2 of EPA 2023). It is important to recognize many other pesticides are authorized for use on corn or soybean. Also, not all the pesticides on the list will be used on a field converted to corn or soybean because of the RFS Set Rule. However, details on the pesticide use at a specific field are not available (e.g., which pesticides are applied, their application rates, and their application methods). Existing models used to estimate pesticide concentrations in aquatic habitats, such as the Pesticide in Water Calculator (PWC) and SWAT, require more information than is available to provide useful outputs for this assessment. Land uses typically involve applications of multiple different pesticides, so any changes in pesticide concentrations due to the RFS Set Rule will involve a complex mixture of numerous pesticides. Examples include insecticides such as lambda-cyhalothrin that can potentially directly harm NMFS species or reduce invertebrate abundance, and herbicides such as glyphosate that can potentially reduce terrestrial and aquatic vegetation important to aquatic habitats to support the aquatic food web, habitat to support terrestrial invertebrate infall, and shade, which assists in regulating in-water temperatures. For the purposes of this assessment, characterizing the composition of the pesticide mixture at any specific location is not feasible (both at the edge-of-field and watershed). Even at the large watershed scale, an estimate of overall changes in pesticides based on the SWAT modeling for nutrients (e.g. the 0.3%–0.8% modeled increase for nitrogen) does not address the details of the pesticides within the mixture. Similar to the other two stressors, NMFS assessed increases in pesticide loadings only qualitatively. Given the uncertainties around which pesticides would be present and their toxicities, NMFS assumed for the purpose of this analysis that the potential increase in pesticides present would be toxic enough to produce some impact to listed species or their designated critical habitat. The magnitude of the pesticide exposures and resulting impacts would be related to the proximity to the converted acres producing the increases in pesticide loading.

It is important to recognize that existing activity prior to any conversion to corn or soybean because of the RFS Set Rule may already be impacting water quality. For example, in addition to their use on corn, glyphosate and lambda-cyhalothrin are used on forage hay/silage, pastureland, and rangeland (https://www.cdpr.ca.gov/docs/pur/pur21rep/pur_data/pur2021_indexed_by_commodity.pdf). Additionally, pasture and rangelands may experience heavy traffic from animals causing soil erosion and nutrient deposition from feces into local waterbodies. The impact of a pollutant on water quality due to the RFS Set Rule will depend on the change in that pollutant's concentration (e.g., glyphosate) from what was present before conversion (e.g., glyphosate use on the pasture) to the concentration present after conversion (e.g., glyphosate use on the corn field). The lack of available information on the collective use of pesticides on pasture adds to the uncertainty in estimating the change in pesticides due to the RFS Set Rule because much of the land conversion is expected to be from pasture to crops in response to the rule.

Therefore, for nutrients, sediments, and pesticides, there is a lack of the detailed information available that would be needed to quantitatively estimate the potential changes in pollutant loading into aquatic habitats resulting from land converted because of the RFS Set Rule. Accordingly, NMFS applied a qualitative approach to assessing the effects on ESA-listed and proposed species and designated and proposed critical habitats due to changes in water quality. Key factors regarding water quality in this qualitative approach are: 1) any changes in water quality will be related to the extent of land conversion within and upstream of a species' range and critical habitat units; 2) the largest changes in water quality will occur in small waterbodies adjacent to converted cropland; and 3) changes in water quality in downstream waterbodies will be influenced by dilution and degradation, which will increase with distance from the land converted to corn or soybean.

Effects on listed species and designated critical habitats of the RFS Set Rule
The sections above briefly summarize the available information NMFS used in assessing the effects of the RFS Set Rule on listed and proposed species and designated and proposed critical habitats. In addition to being relatively limited, the information involves uncertainties, as described above, and the potential effects to species and critical habitats in light of these uncertainties and the assumptions we made based on them and the historic information provided by EPA are described below.

NMFS's approach to assessing potential effects on listed and proposed species and designated and proposed critical habitat incorporated the best available information when considering the three water quality stressors (i.e., nutrients, sediments, and pesticides) and likelihood of exposures, magnitude of exposures, and potential responses to exposure. Although the magnitudes of potential responses to exposures cannot be quantitatively estimated, NMFS can qualitatively identify generalized responses that are possible due to exposures to the three water quality parameters that may be affected by the RFS Set Rule and that represent effects to listed and proposed species and designated and proposed critical habitats. Increases in nutrients such as nitrogen can produce excessive growth of phytoplankton and algae. This can lead to other water quality impacts such as changes in species composition affecting the food web and reduced dissolved oxygen (hypoxia) affecting survival and PBFs such as water clarity. Increases in sediments can increase turbidity affecting species' ability to see prey and increase settling that can bury eggs and corals and degrade habitat quality. Increases in pesticides such as insecticides and herbicides can be directly toxic to fish, invertebrates, and plants causing mortality or sublethal effects on behavior, growth, and reproduction (for a review see Mateo-Sagasta 2018).

To assess exposures to changes in water quality, NMFS relied on EPA's estimates of the potential extent of changes in crop production associated with species' ranges and critical habitat units. NMFS used these estimates as qualitative surrogates to assess the likelihood a species or habitat would be in close proximity to a change in land use due to the RFS Set Rule (e.g., for small streams within 2,600 feet to account for pesticide drift). The largest responses to exposure are expected in small waterbodies located near the edge-of-field where the highest exposure concentrations of the three water quality stressors are likely to occur. NMFS applied this likelihood of exposure to the highest stressor concentrations to species whose ranges and/or critical habitat units overlap with potential locations of crop conversion (Tables 7-10); therefore, might be located in close proximity to a converted acre.

Aquatic habitats further away from the edge-of-field and in larger waterbodies such as rivers could see changes in exposures as these three stressors move downstream. The likelihood of exposure to some amount of one or more of the stressors is anticipated to increase because converted crop acres are likely to be somewhere upstream, but the magnitude of the exposure concentration will decrease as the pollutants from the converted crop acres are diluted by contributions from other upstream acres of land and as the pollutants degrade, settle, or are otherwise no longer biologically available. NMFS considered this to be the case not just for species in Tables 7-10, but for all of its species within the action area (Table 1) because that represents waterbodies downstream of any potential crop conversion regardless of whether that conversion is within the species range or designated critical habitat unit. As part of assessing exposure magnitudes in larger waterbodies, NMFS qualitatively relied on the extent of changes in crop production at a watershed scale as a surrogate for the potential contribution of the RFS Set Rule to overall pollutant concentrations in watersheds.

In assessing the potential effects of the action, NMFS considered the uncertainties and assumptions that EPA identified in the BE (EPA 2023) to inform the limits of its qualitative assessment. Several key considerations included:

- refiners may not rely entirely on increased crop production to meet the RFS Set Rule,
- acres potentially converted to corn or soybean are less likely to be located within species' ranges and designated critical habitat units associated with NMFS species,
- all potentially converted acres are not likely to be in close proximity to aquatic habitats, and
- prior to potential conversion, many acres will already be contributing some stressors and corresponding degree of exposure because pastureland, which is the most likely to be converted, is also treated with pesticides and nutrients and releases sediments.

Given the above, the estimates of changes in crop production we used to qualitatively assess the likelihood and magnitude of exposures were considered to be upper estimates and that actual changes that may be due to the RFS Set Rule would produce exposures that are less likely and smaller.

Additionally, NMFS considered the inherent variability in measures of both exposure and response even absent any action such as the RFS Set Rule. Pollutant concentrations are known to vary both temporally and spatially. For example, modelled exposure estimates for even a single pesticide following applications to corn can vary by over 10% due to differences in factors such as precipitation and soil type (e.g., PWC estimates in NMFS 2022). Likewise, response estimates such as mortality rates in a population not exposed to a specific stressor can vary by over 5% (e.g., standard deviation of juvenile salmon mortality in population models in NMFS 2022).

Finally, NMFS considered how sensitive responses may be to changes in exposures. For example, binary responses are typically assessed using a regression-based approached using a probit model to predict a response to an exposure (e.g., NMFS 2022 with a probit slope of 4.5). For this example, a 1% increase in exposure at the concentration that produces a 50% response (EC_{50}) will increase the predicted response from 50.0% to 50.8%. A 1% increase in exposure from a lower initial exposure (more likely to be occurring) such as 0.3x the EC_{50} will increase the predicted response from 0.9% to 1.0%. Importantly, both the increase in exposure and the increases in responses are within the likely confidence intervals associated with their measures without the increase (e.g., the baseline conditions prior to any crop conversion). A measurable change in response that could be attributable to the RFS Set Rule would require a larger change in exposure in order to have a response measurably different from the baseline.

In determining whether the RFS Set Rule is not likely to adversely affect ESA-listed and proposed species or designated and proposed critical habitat units, NMFS considered the available information and the two different exposure scenarios described above (i.e., exposures where NMFS resources are modeled to be in close proximity to a potential crop conversion area, and exposures where NMFS resources are modeled to be downstream of a potential crop conversion area).

1) Exposures in close proximity to potential crop conversions

Exposures resulting from crop conversion in close proximity to species or their habitats are anticipated to produce the highest magnitude exposures to the three water quality stressors due to a lack of dilution or degradation. Based on the analyses summarized in Tables 7-10, species for which this was a concern are listed in Table 11.

Table 11. Summary of data from Tables 7-10 on the % increase of corn and soybean acres within the range or designated critical habitat (CH) of species after potential expansion due to the RFS Set Rule. Ranges or CHs with no expansion acres are denoted with na.

		Change in % overlap			
		Corn Acres		**Soybean Acres**	
Species	**ESU/DPS**	**Range**	**CH**	**Range**	**CH**
Atlantic salmon	Gulf of Maine	0.001	0.001	na	na
Atlantic sturgeon	Carolina	0.013	0.018	0.059	0.126
Atlantic sturgeon	Chesapeake Bay	0.012	0.013	0.139	0.132
Atlantic sturgeon	Gulf of Maine	0.002	0.014	na	na
Atlantic sturgeon	New York Bight	0.008	0.013	0.062	0.130
Atlantic sturgeon	South Atlantic	0.021	0.025	0.071	0.106
Bocaccio	Puget Sound/ Georgia Basin	0.013	0.009	na	na
Chinook salmon	Central Valley spring-run	0.009	0.008	na	na
Chinook salmon	Lower Columbia River	0.004	0.006	na	na
Chinook salmon	Puget Sound	0.008	0.009	na	na
Chinook salmon	Sacramento River winter-run	0.009	0.011	na	na
Chinook salmon	Snake River fall-run	0.033	0.034	na	na

Chinook salmon	Snake River spring/ summer-run	0.014	0.012	0.000	0.000
Chinook salmon	Upper Columbia River spring-run	0.032	0.026	na	na
Chinook salmon	Upper Willamette River	0.018	0.019	na	na
Chum salmon	Columbia River	0.007	0.010	na	na
Chum salmon	Hood Canal summer-run	0.004	0.004	na	na
Coho salmon	Lower Columbia River	0.004	0.004	na	na
Coho salmon	Oregon coast	0.001	0.001	na	na
Coho salmon	Southern Oregon & Northern California coasts	0.000	na	na	na
Eulachon	Southern	0.010	0.009	na	na
Green sturgeon	Southern	0.004	0.004	na	na
Gulf sturgeon		0.003	0.020	0.024	0.070
Shortnose sturgeon		0.013	na	0.077	na
Smalltooth sawfish	U.S. portion of range	0.000	na	0.002	na
Sockeye salmon	Snake River	0.026	0.021	na	na
Steelhead	California Central Valley	0.010	0.009	na	na
Steelhead	Central California coast	0.000	na	na	na
Steelhead	Lower Columbia River	0.005	0.005	na	na
Steelhead	Middle Columbia River	0.014	0.013	na	na
Steelhead	Puget Sound	0.008	0.008	na	na
Steelhead	Snake River Basin	0.015	0.015	0.000	0.000
Steelhead	Upper Columbia River	0.031	0.032	0.003	na
Steelhead	Upper Willamette River	0.023	0.023	na	na
Sunflower sea star		0.002	na	na	na
Yelloweye rockfish	Puget Sound/ Georgia Basin	0.013	0.010	na	na

For species whose ranges and designated critical habitats do not overlap with potential conversion acres (i.e. those not Table 11), effects of proximal exposures were considered to be discountable. The best available information was used to identify the potential for overlap. Because there is no information to suggest that these particular species and critical habitat units will be in close proximity to potential crop conversions, exposures to the highest potential increases in water quality stressors are extremely unlikely to occur.

For species whose ranges and designated critical habitats do overlap with potential conversion acres (i.e. those listed in Table 11), proximal exposures were considered to be possible and NMFS considered the extents of potential crop conversions and their uncertainties and assumptions in more detail. For example, the largest change in % acres relevant to NMFS' resources represented by a crop conversion was for the potential increase in soybean production within the range of Chesapeake Bay DPS of Atlantic sturgeon (12.035% to 12.174%; Table 9). NMFS considered this increase of 0.139 in the % of acres that may be planted with soybean to be unlikely to occur given consideration of the uncertainties and assumptions in the estimates discussed above. Some of the potential conversion acres may be within a listed or proposed species' range but not be in close proximity to aquatic habitats (e.g., since watersheds include land over 2,600 feet from waterbodies). Therefore, NMFS considered the actual % increase in extent of conversion acres in close proximity to species' aquatic habitats to be substantially less than 0.139. NMFS used the potential increase in extent of crop acres (in this case soybeans) in a species range or designated critical habitat due to the RFS Set Rule to assess the potential for proximal exposures and subsequent responses. Given the uncertainties and confidence intervals associated with estimating exposures discussed above, NMFS considered such small increases to mean that the extent of crop acres following the RFS Set Rule would be indistinguishable from baseline conditions. So for all the species listed in Table 11, NMFS considered effects of proximal exposures to be discountable because they are extremely unlikely to occur.

2) Exposures downstream of potential crop conversions

All species in Table 1 are within the action area EPA identified in its BE (EPA 2023), and EPA indicated that there was a potential for the conversion of crops to affect the species or designated critical habitat. Species in Table 11 could be exposed in larger waterbodies because of crop conversion in areas that are within their range or designated critical habitat unit. All species in Table 1 could be exposed to the stressors from outside their range or designated critical habitat unit as they move downstream from upstream areas where crop conversion has occurred. For these reasons, NMFS considered downstream exposures for all species in Table 1 to be likely.

The magnitude of downstream exposures will depend on the extent of crop conversions upstream and the dilution and degradation of the stressors as they are carried downstream.

For species in Table 11, estimates of changes in crop conversions within the ranges or designated critical habitats are quite small (a change in % of ≤ 0.139). NMFS anticipates that any change in overall pollutant concentrations within those areas following potential crop conversions due to the RFS Set Rule would be extremely minor (<1%) and not represent a measurable increase over baseline conditions associated with land uses within the ranges or designated critical habitats absent the RFS Set Rule.

For all species in Table 1, NMFS considered downstream exposures from potential crop conversions in watersheds upstream of species ranges and critical habitat units (e.g., the Mississippi River flowing into the Gulf of Mexico). NMFS relied qualitatively on EPA's estimate of a 1-2% increase in nitrogen or phosphorus into the Gulf of Mexico from the Mississippi River basin due to potential crop conversions. NMFS acknowledges uncertainties and assumptions in using this estimate that is based on a model of the Missouri River Basin. Several are similar to those discussed earlier (e.g., assumptions regarding maximum potential crop conversions) while some others are discussed in the BE (EPA 2023). Because of the assumptions, NMFS considers EPA's estimate to be conservative. However, NMFS lacks available information specific to the Mississippi River Basin, other stressors (e.g., pesticides), and other regions (e.g. Chesapeake Bay). As discussed earlier, existing models are not adequate or require detailed information that is not available, so NMFS considers the estimates to be the best available information.

For downstream exposures both from waterbodies within a species' range and designated critical habitat and from outside watersheds upstream, the best scientific and commercial data available shows that the potential magnitudes of exposures to the three identified water quality stressors are quite small, and likely within the inherent variability of exposures absent the RFS Set Rule.

More importantly, NMFS considers the potential downstream exposure magnitudes small enough that all responses due to the RFS Set Rule will not represent a measurable change from baseline responses. NMFS, therefore, considers effects of downstream exposures to be insignificant.

Conclusion

Based on an analysis of the available information, NMFS concurs with EPA that the effects of the proposed action may affect, but are not likely to adversely affect the ESA-listed and proposed species and/or designated and proposed critical habitats identified in Table 1.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the federal agency**,** or by NMFS, where discretionary federal involvement or control over the action has been retained or is authorized by law and if (1) new information reveals effects of the action that may affect an ESA-listed species or designated critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the ESA-listed species or designated critical habitat that was not considered in this concurrence letter; or (3) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR §402.16).

Please direct questions regarding this letter to Dr. David Baldwin, Consulting Biologist, at david.baldwin@noaa.gov, or by phone at (301) 427-8412, or me at tanya.dobrzynski@noaa.gov, or by phone at 240-723-6321.

Sincerely,

DOBRZYNSKI.TANYA.JANINE.1365846517

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Tanya Dobrzynski
Chief, ESA Interagency Cooperation Division
Office of Protected Resources

cc: Tuana Phillips (phillips.tuana@epa.gov)

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